

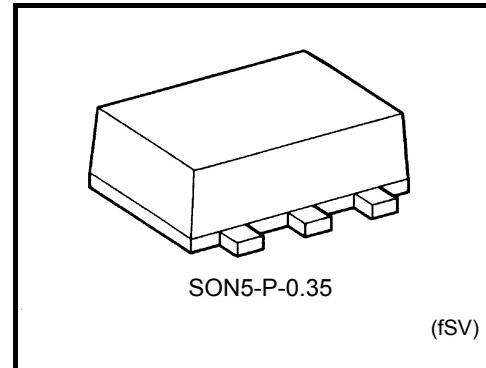
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TC7SH32FS

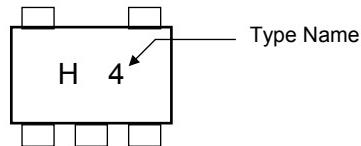
## 2-INPUT OR GATE

### Features

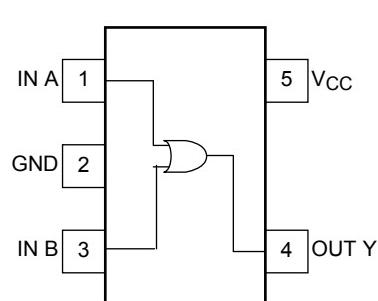
- High speed:  $t_{pd} = 3.8 \text{ ns}$  (typ.) at  $V_{CC} = 5 \text{ V}$
- Low power dissipation:  $I_{CC} = 2 \mu\text{A}$  (max) at  $T_a = 25^\circ\text{C}$
- High noise immunity:  $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (min)
- 5.5V tolerant input.
- Wide operating voltage range:  $V_{CC}$  (opr) = 2~5.5 V



### Marking (top view)



### • Pin Assignment



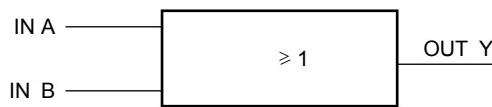
Weight : 0.001 g (Typ.)

**Absolute Maximum Ratings (Ta = 25°C)**

Characteristics	Symbol	Rating	Unit
Supply voltage range	V <sub>CC</sub>	-0.5~7.0	V
DC input voltage	V <sub>IN</sub>	-0.5~7.0	V
DC output voltage	V <sub>OUT</sub>	-0.5~V <sub>CC</sub> + 0.5	V
Input diode current	I <sub>IK</sub>	-20	mA
Output diode current	I <sub>OK</sub>	±20	mA
DC output current	I <sub>OUT</sub>	±25	mA
DC V <sub>CC</sub> /ground current	I <sub>CC</sub>	±50	mA
Power dissipation	P <sub>D</sub>	50	mW
Storage temperature	T <sub>stg</sub>	-65~150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

**Logic Diagram****Truth Table**

A	B	Y
L	L	L
L	H	H
H	L	H
H	H	H

**Operating Ranges**

Characteristics	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	2.0~5.5	V
Input voltage	V <sub>IN</sub>	0~5.5	V
Output voltage	V <sub>OUT</sub>	0~V <sub>CC</sub>	V
Operating temperature	T <sub>opr</sub>	-40~85	°C
Input rise and fall time	dt/dv	0~100 (V <sub>CC</sub> = 3.3 ± 0.3 V) 0~20 (V <sub>CC</sub> = 5 ± 0.5 V)	ns/V

**Electrical Characteristics****DC Characteristics**

Characteristics	Symbol	Test Circuit	Test Condition	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		Unit
					Min	Typ.	Max	Min	Max	
High-level input voltage	V <sub>IH</sub>	—	—	2.0	1.50	—	—	1.50	—	V
				3.0~5.5	V <sub>CC</sub> × 0.7	—	—	V <sub>CC</sub> × 0.7	—	
Low-level input voltage	V <sub>IL</sub>	—	—	2.0	—	—	0.50	—	0.50	V
				3.0~5.5	—	—	V <sub>CC</sub> × 0.3	—	V <sub>CC</sub> × 0.3	
High-level output voltage	V <sub>OH</sub>	—	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -50 μA	2.0	1.9	2.0	—	1.9	V
					3.0	2.9	3.0	—	2.9	
					4.5	4.4	4.5	—	4.4	
				I <sub>OH</sub> = -4 mA	3.0	2.58	—	—	2.48	
				I <sub>OH</sub> = -8 mA	4.5	3.94	—	—	3.80	
Low-level output voltage	V <sub>OL</sub>	—	V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OL</sub> = 50 μA	2.0	—	0.0	0.1	—	V
					3.0	—	0.0	0.1	—	
					4.5	—	0.0	0.1	—	
				I <sub>OL</sub> = 4 mA	3.0	—	—	0.36	—	0.44
				I <sub>OL</sub> = 8 mA	4.5	—	—	0.36	—	0.44
Input leakage current	I <sub>IN</sub>	—	V <sub>IN</sub> = 5.5 V or GND	0~5.5	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I <sub>CC</sub>	—	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	2.0	—	20.0	μA

AC Characteristics (Input:  $t_r = t_f = 3 \text{ ns}$ )

Characteristics	Symbol	Test Circuit	Test Condition		$T_a = 25^\circ\text{C}$			$T_a = -40\text{--}85^\circ\text{C}$		Unit	
			$V_{CC} (\text{V})$	$C_L (\text{pF})$	Min	Typ.	Max	Min	Max		
Propagation delay time	$t_{PLH}$	—	—	$3.3 \pm 0.3$	15	—	5.5	7.9	1.0	9.5	
					50	—	8.0	11.4	1.0	13.0	
	$t_{PHL}$	—	—	$5.0 \pm 0.5$	15	—	3.8	5.5	1.0	6.5	
					50	—	5.3	7.5	1.0	8.5	
Input capacitance	$C_{IN}$	—	—	—	—	—	4	10	—	10	pF
Power dissipation capacitance	$C_{PD}$	—	—	(Note)	—	15	—	—	—	—	pF

Note:  $C_{PD}$  is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

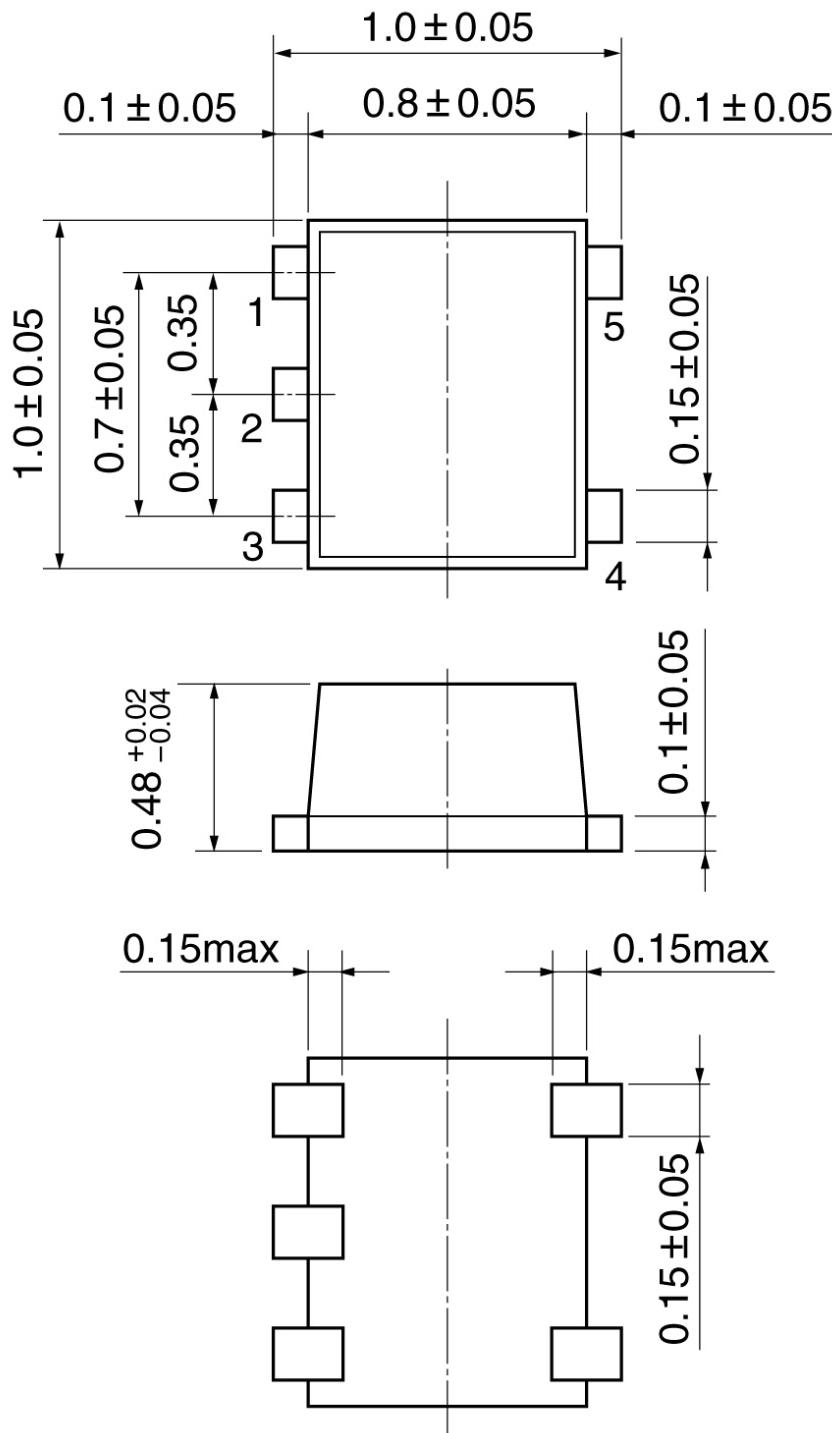
Average operating current can be obtained by the equation:

$$I_{CC(\text{opr})} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

**Package Dimensions**

SON5-P-0.35

Unit:mm



Weight: 0.001 g (typ.)

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20070701-EN GENERAL

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